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NINTH ANNUAL GRADUATE FORTNIGHT

"Trauma; Occupational Diseases and Hazards"

October 19 to 31, 1936

OPENING REMARKS*

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The educational symposium which we open tonight is an attempt to present to the profession the advances in medicine, so that the busy practitioner may be informed from authoritative sources as to the latest thought and knowledge on a given topic. The series was instituted in 1928, and each year a subject of outstanding importance in the practice of medicine and surgery has been selected. At the evening meetings, various aspects of the subject are discussed by well-known authorities. In the afternoons the hospitals of the City give clinics, which deal with practical phases of the same problem. This year the subject is Trauma; Occupational Diseases and Hazards.

It is a common observation that the simple and obvious things in life are the ones most often overlooked. This is notably true in medicine. Indeed, there is an old saying that in the search for the icthyosaurus the common bed bug is often overlooked. The medical mind, from that in the professorial chair down to the first year student is focused upon the cause and cure of cancer, the etiology of the unexplained exanthemata, the incidence of aleukemic leukaemia and the distinction between Banti's disease and

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splenic anaemia. The treatment of the common injuries is touched upon but lightly in the medical school and at surgical meetings. The application of a bandage, the suturing of a wound, the care of local infections and the treatment of fractures and dislocations are relegated to a secondary place in the efforts of the teacher of surgery. Yet, modern conditions have brought injuries and occupational diseases and hazards to a position of primary importance to the community. The speeding up of present day activities by the various methods of modern transportation have relegated the relatively safe horse drawn vehicle of our fathers to little more than a memory. Man now travels not only horizontally, as of old, but upward and downward, like moles burrowing under rivers and mountains, and birds soaring in the air. Every phase of these developments, their preparation and perpetration, is attended by an ever increasing toll of accidents and deaths.

With the enormous growth of industrial enterprises, injuries and occupational hazards take on increasing importance. Industry is constructive in the inanimate but destructive to man. The powerful implements of modern warfare have reached such refinement as to necessitate almost as many physicians and surgeons as line officers in an army.

It is fitting therefore that this subject be periodically reviewed. While we cannot expect to be told much that is new, we will find that much which has been forgotten will be again brought to light. We are now in the same frame of mind as was Pott who wrote in 1777: "no man, however slightly acquainted with the history of Surgery, can have the smallest doubt of the superiority which its present state justly claims over that of our predecessors. . . . The surgery of the last century was coarse and cruel, painful and tedious. To simplify the art has been the aim of all the best practitioners of later times."

It is striking how much of our present day "new" knowledge and methods are but refinements of what was known and practiced in the past. If I may be allowed to digress, I shall cite historical evidence on this point.

Dietary instructions for various conditions were laid down by Hippocrates. Gymnastics were practiced by the early Chinese and massage by the ancient Egyptians. Even in antiquity, the value of climatic treatment for pulmonary affections was emphasized and the communicability of consumption was recognized by Avicenna about 1000 A.D. The clyster was extensively employed for many diseases. Herodotus relates that the Egyptians had the habit of washing their intestines every month for the preservation of health.

Fads have always been a menace to progress. For instance, blood letting for generations was blindly practiced. Byron in his last illness opposed being bled for fever, remarking that "less slaughter is affected by the lance than the lancet, that minute instrument of mighty mischief." After Louis XIV had his rectal fistula operated upon a number of loyal Frenchmen elected to have this then fashionable operation done upon themselves.

Military exigencies have been responsible for much of the development of traumatic surgery throughout the ages. This is demonstrated in the history of the Greeks, Romans and Macedonians. What a thrill it is to review the description of the treatment of the thoracic wound of Alexander the Great. At the age of 28 he was gravely wounded by a heavy arrow which pierced his coat of mail and lodged under the right nipple. Air and blood are said to have escaped from the wound and he was near death. The historian Quintas Curtius recorded that Cristodemus of Cos sawed off the shaft of the arrow. When the armour had been removed, the arrow head was extracted through a deep incision.

The Crimean War was responsible for Florence Nightingale and the development of nursing. The recent war revolutionized traumatic surgery. It advanced the prevention of tetanus; the treatment of gas bacillus infection and the knowledge of its countless bacterial factors; debridement; closure by primary and secondary suture; effective care of wounds, notably by the Carrel-Dakin method; the treatment of shock and, finally, untold details

in the handling of fractures both simple and compound. Much of this has been forgotten. One hears decried the Carrel-Dakin method. It is just as efficient now as it was twenty years ago, if properly employed, which is rarely the case. Tetanus can always be prevented, yet we see cases in civil practice where precautions are neglected. How often the practitioner in civil life forgets to administer the antitoxin at the time of a secondary operation following trauma. I have recently seen a death result from this omission. One does not appreciate and use sufficiently traction and suspension in complicated cases of bone lesions. In the War, the Balkan frame with its limitless elaborations was of inestimable value. I remember a young officer with knees and arms operated upon who was under a Balkan frame with suspension and traction devices running in all directions. One morning on entering the officers' ward I noticed a large sign which read "Pulley Pool, the mechanical maniac." Many modern surgeons take a similar view of such devices regarding them as incumbrances. Yet they have an important place in treatment.

Our theme is to be developed by eminent contributors to whom on behalf of the Officers and Fellows, I extend our deepest thanks. It is my privilege to welcome you and to offer you the facilities of the Academy. I hope you will join me in an expression of appreciation to the Graduate Fortnight Committee, the Committee on Clinics, the Committee on Scientific Exhibits, the Subcommittee on Therapeutics, and to Dr. Frederick P. Reynolds who has been Secretary of the Committee on Medical Education since April, 1924. That committee has been responsible for the Graduate Fortnight. It is with deep regret that we record the fact that this is the last "Fortnight" under the direction of Dr. Reynolds.

The Wesley M. Carpenter Lecture

HISTORICAL BACKGROUND OF INDUSTRIAL AND OCCUPATIONAL DISEASES[1]

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It is the destiny of man that he has to work to maintain his life. He has to produce and gather the food that his organism requires and has to produce goods to protect himself against the climate and to make his life easier and more enjoyable. The greatest advance in the history of human civilization was the step from the paleolithic to the neolithic age, from the food-gathering to the food-producing stage, when man had learned to cultivate plants, to domesticate animals, to perfect his tools. Man struggled with nature and he is conquering it gradually through his intelligence, inventiveness and skill. The productive forces, animate and inanimate, active and passive, man and his raw material, the laborer and his tool, were the decisive factors in history.

Man has to work in order to live—and this is good. Work gives significance to our life. It ennobles it. It allows us to create material and spiritual values without which life would not be worth living. If society progressed, it was due to the cooperative efforts of all its members. Man has a duty to work but he should also have a right to work.

Work balances our life and is therefore an essential factor of health. Yet we all know that man in the pursuit of his work is exposed to all kinds of hazards which threaten his life. This has always been the case no matter what the work was. The stone age man gathering his food, hunting animals, was subject to accidents. Neolithic bones showing traces of fractures make this evident.

With developing civilization production increased. New occupations created new hazards. The working conditions of a definite period and country represent an important

1. Delivered October 19, 1936.

criterion of a given civilization. When we look at the history of civilization from this point of view, we certainly have no reason to be proud of our past.

We are inclined to value a civilization according to its artistic achievements. We admire the pyramids and the temples of ancient Egypt which have survived the centuries and millenniums but we forget that they were built with the blood and tears of thousands of human beings. Labor in ancient civilization was primarily slave labor. The pyramids were built by state slaves whose lives had no value whatever, whom every war would replace. We still can see the Egyptian workers laboring under the whip as represented on wall paintings and in reliefs. The lot of the city workers was hardly any better and we can still perceive their voice of rebellion. Egyptian literature has preserved, besides a huge mass of religious texts written in praise of the gods, a few scraps which tell us of the hard life of the people.

I have never seen a blacksmith acting as ambassador or a foundry worker sent on a mission, but what I have seen is the metal worker at his work: he is grilled at the mouth of the furnace. The mason, exposed to all weathers and all risks, builds without clothing. His arms are worn out with work, his food is mixed up with dirt and rubbish: he bites his nails, for he has no other food. The barber breaks his arm to fill his stomach. The weaver engaged in home work is worse off in the house than the women: doubled up with his knees drawn up to his stomach, he cannot breathe. The laundryman on the quays is the neighbour of crocodiles. The dyeworker stinks of fish spawn: his eyes are tired, his hand works unceasingly and as he spends his time in cutting up rags he has a horror of clothing[2].

We admire the graceful Greek bronze statuettes that fill our museums but we do not think of the copper miners providing material for these works of art, or the coal miners digging for coal to make the bronze, working ten hours in narrow galleries suffocated by heat and smoke. They were prisoners of war or convicts as a rule.

The ancient physicians, keen observers as they were, noticed the influence of certain occupations on the worker's health. A good deal of information is scattered all over the Greek and Roman literature. A case of lead poisoning was

2. Papyrus Sallier, 2, 4, 6, and following.

correctly described by Hippocrates[3]. Pliny speaks of the noxious influence of lead, mercury and sulphur on those who handled these metals[4]. The poets, Martial, Juvenal, Lucretius, reflected the views held by the layman and wrote of the dangers of certain occupations, of the diseases of sulphur workers[5] and blacksmiths[6], of the varicose veins of the augurs[7] and the hard fate of the gold miners[8]. But nothing was done to protect the workers. They had to help themselves as the minium refiners described by Pliny did who put membranes as a mask before their faces[9]. Medical care was given to those who served to entertain the people, the gladiators. Galen started his career by being physician to a gladiator's school in Pergamon.

The ancient physicians were not actually interested in the health of the manual laborers. They devoted their attention almost exclusively to the upper class. It is quite characteristic that Celsus believes that medicine originated with the philosophers who, having an unhealthy mode of living naturally would be interested in correcting it[10]. The author of the hippocratic treatise, *Peri diaites,* gives special dietetic rules for such people who, having some business to attend, were not able to devote all their time and all their attention to their health[11]. It would never have occurred to him to prescribe any definite hygiene to craftsmen or workers.

We must not forget, however, that ancient technology was mostly small scale technology. The artisans frequently

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3. Epid. VI, 25; ed. Littré V, 164-166.
4. Nat. Hist. XXXIV, 50; XXXIII, 40.
5. Martial, Epigr. XII, 57, 14.
6. Juvenal, Sat. X, 130.
7. Juvenal, Sat. VI, 397.
8. Lucretius, VI, 811.
9. Pliny, Nat. Hist. XXXIII, 40: "Persons employed in the manufactories in preparing minium protect the face with masks of loose bladder-skin, in order to avoid inhaling the dust, which is highly pernicious; the covering being at the same time sufficiently transparent to admit of being seen through."
10. Celsus, Prohoem. 6-7.
11. Peri diaites III, 68; ed. Littré VI, 594.

worked in the open air, as they still do in the Orient, so that the hazards were infinitely less than in later centuries after technology had assumed larger proportions.

Ancient civilization created great cultural values but it was a culture that was shared by only a small upper class and endless human lives had to be sacrificed and a great deal of suffering had to be endured to allow this culture to flourish.

Hazards occurred not only in work but also in certain recreational activities. Hippocratic surgery is mostly bone surgery and reflects the experiences the surgeons had in the gymnasiums where dislocations, fractures and other injuries must have been quite frequent.

The Middle Ages scarcely made any contributions to the subject and it is not before the end of the 15th century that we begin to find a special literature devoted to occupational diseases.

Why then? For various reasons. Medicine had progressed and the physicians were keenly interested in describing new diseases. But there are other, economic reasons. The volume of trade had increased considerably which created a great demand for metals, particularly gold and silver for currency as a medium of exchange. The voyages of discovery were undertaken not so much in the interest of science as primarily in search of precious metals. Besides, fire arms were used more and more frequently which created a strong demand for iron, copper and lead. The shallow mineral deposits were exhausted and it was necessary to dig deeper which obviously created increased hazards. At the same time in many countries the farmers were evicted, were divorced from the means of production and became proletarians who had nothing to sell but their labor powers. Many of them went into industry.

The *morbi metallici* were the first occupational diseases to attract the attention of medical writers. In 1473 a German physician in Augsburg, Ulrich Ellenbog, wrote a little pamphlet of seven small printed pages, *Von den gifftigen besen tempffen und reuchen* (On the poisonous

wicked fumes and smokes). Augsburg at that time was famous for its goldsmiths. Ellenbog, who apparently had such goldsmiths among his patients, noticed that some of their troubles were probably due to their working conditions. He wrote his pamphlet as a memorandum describing the dangers of fumes that developed from coal, nitric acid, lead, mercury and other metals. He advised the goldsmiths to work, whenever possible, in the open air, to cover their mouths when the fumes developed and, in the style of the time, recommended a number of drugs to be smelled as a measure of protection. Ellenbog's memorandum circulated in manuscript copies in the workshops and was printed in about 1524. It must have been very popular because only one copy of the printed pamphlet is known to exist. It was, however, reproduced in facsimile in 1927[12].

Ellenbog's was just a short memorandum. The first monograph devoted to occupational diseases is due to Paracelsus who, greatly interested in chemistry, visited many mines, particularly those of Villach in Kärnten where his father had settled to practice. He lived and worked with the miners and got first-hand evidence of the appalling conditions under which they were laboring and the very serious hazards to which they were exposed.

Paracelsus' monograph is a beginning. Every writer on mining after that time never failed to touch the diseases peculiar to this industry. A very good example of this type of literature is Agricola's work, *De re metallica*[13], published in 1556. In Book VI he says,

> It remains for me to speak of the ailments and accidents of miners, and of the methods by which they can guard against these, for we should always devote more care to maintaining our health, that we may freely perform our bodily functions, than to making profits. Of the illnesses, some affect the joints, some the eyes, and finally some are fatal to men.

12. Ulrich Ellenbog, Von den gifftigen besen tempffen und reuchen, Eine gewerbe-hygienische Schrift des XV. Jahrhunderts, herausgegeben von Franz Koelsch und Friedrich Zoepfl, Munich, 1927.

13. Georgius Agricola, De re metallica, translated from the first Latin edition of 1556 by H. C. Hoover and L. H. Hoover, London, 1912.

He then goes on describing the various hazards that threatened the miners, the abundant water often collecting in shafts making them cold and, in this way, injuring the workers; the dust that "has corrosive qualities and eats away the lungs, and implants consumption in the body; hence in the mines of the Carpathian Mountains women are found who have married seven husbands, all of whom this terrible consumption has carried off by a premature death." Stagnant air produces a difficulty in breathing. The remedy is to be found in the ventilating machines. Or, the air is infected with poison, causing swellings and paralysis. Accidents are described as being not rare, workmen slipping from ladders in the shafts, breaking their arms, legs or necks, or falling into the sumps and being drowned. Mountain slides occurred as was the case in Rammelsberg where in one day "400 women were robbed of their husbands." Venomous ants were found in several mines. And finally there was one hazard that we no longer know. "In some of our mines, though in very few, there are pernicious pests. These are demons of ferocious aspect . . . demons of this kind are expelled and put to flight by prayer and fasting."

Special monographs on diseases of the miners were written by several German physicians, the most important being Martin Pansa[14], Leonardus Ursinus[15], Samuel Stockhausen[16], Suchlandius[17].

There is no doubt that mining was the most dangerous of all occupations and therefore was given attention first. In the 17th century books began to be written on the diseases of other occupational groups. They concern less the working class than the upper class, the courtiers, the scholars, men of letters in general, but then also soldiers and sailors because the fighting strength of an army or navy was determined to quite an extent by the health conditions.

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14. Consilium peripneumoniacum, 1614.
15. De morbis metallariorum, Leipzig, 1652.
16. De Lythargyrii fumo noxio morbico . . . , 1656.
17. De paralysi metallariorum, Utrecht, 1693.

A great many scattered observations on occupational diseases are found in the medical literature of the 17th century. The century of Sydenham was naturally interested in disease entities and endeavored to describe their clinical picture accurately. But the 17th century was also the century of the iatromechanists who attempted to explain the functions of the human body mechanically, who liked to compare the organs to tools and therefore were interested in tools and machines.

And then, in 1700, the Italian physician Bernardino Ramazzini published his famous book, *De morbis artificum diatriba*, of which an English translation appeared in 1705 under the title: *A treatise of the diseases of tradesmen, shewing the various influence of particular trades upon the state of health; with the best methods to avoid or correct it, and useful hints proper to be minded in regulating the cure of all diseases incident to tradesmen*[18]—the first textbook on occupational diseases. I have just re-read it. It is a fine book, a real medical classic. It is to the history of occupational diseases what Vesalius' book is to anatomy, Harvey's to physiology, Morgagni's to pathology. It would be worth while reprinting the complete English translation of the book as it is not only interesting from the medical point of view but gives a very good account of the working conditions of the time[19].

Ramazzini was a distinguished physician in Modena, professor at the University of this city and in 1700, the year his book was published, he was called to the University of Padua. Discussing the diseases of "Cleansers of Jakes" (chapter XIV), he tells us how he became interested in his subject.

> The Accident, from which I took occasion to write this Treatise of the Diseases of Tradesmen is as follows. In this City, which is very populous for its Bigness, and is built both close and high, it is usual to have their

18. Further English editions were published 1746 and 1750.

19. Abstracts have been reprinted by Herman Goodman, New York, 1933. The original Latin text was reprinted with an introduction by F. C. Mayer (now at the Army Medical Library in Washington), in Budapest, 1928.

Houses of Office cleansed every third Year; and, while the Men employed in this Work were cleansing that at my House, I took notice of one of them, who worked with a great deal of Anxiety and Eagerness, and, being moved with Compassion, I asked the poor Fellow, Why he did not work more calmly and avoid over-tiring himself with too much Straining? Upon this the poor Wretch lifted up his Eyes from the dismal Vault, and replied, That none but those who have tried it could imagine the Trouble of staying above four Hours in that Place, it being equally troublesome as to be struck blind. After he came out of the Place, I took a narrow View of his Eyes, and found them very red and dim; upon which I asked him, If they had any usual Remedy for that Disorder? He replied, their only Way was to run immediately Home, and confine themselves for a Day to a dark Room, and wash their Eyes now and then with warm Water; by which Means they used to find their Pain somewhat assuaged. Then I asked him, if he felt any Heat in his Throat, and Difficulty of Respiration, or Head-ach? And whether the Smell affected their Nose, or occasioned a Squeamishness? He answered, That he felt none of those Inconveniencies; that the only Parts which suffered were the Eyes, and that if he continued longer at the same Work, without Interruption, he should be blind in a short Time, as it had happened to others. Immediately after he clapt his Hands over his Eyes, and run Home. After this I took notice of several Beggars in the City, who, having been imployed in that Work, were either very weak-sighted, or absolutely blind.

He decided to study the diseases peculiar to other occupations. He went to the workshops, talked to the people, studied the conditions under which they worked.

The Shops, or Work-houses of Tradesmen are the only Schools in which we find any satisfactory Knowledge of these Matters; and out of these Places I have endeavoured to pick whatever might best please the Taste of the Curious; and chiefly indeed to suggest such Cautions, as may serve to prevent and cure the Diseases to which Tradesmen are usually subject.

He studied the literature on the subject and became more and more convinced that the occupational diseases played an important part in the life of a community.

We must own that some Arts intail no small Mischiefs upon the respective Artisans, and that the same means by which they support Life, and maintain their Families, are oftentimes the Cause of grievous Distempers, which hurry them out of the World. Now, having observed this frequently in the Course of my Practice, I bent all my Thoughts upon writing a Treatise of the Diseases of Tradesmen or Artificers.

He was aware of the fact that his subject was new and that such a first book could not be but an "imperfect performance" and yet he succeeded in covering the ground very thoroughly, describing the various trades and their hazards, indicating methods to prevent the diseases, or when they had occurred, to cure them. His therapy, of

course, follows the trends of the day. He is like so many of his contemporaries in Italy, an iatromechanist. But the book is full of common sense and inaugurates a new period in the history of the subject.

One other great contribution was derived from it. From then on, when interrogating a patient, the physician would ask what his occupation was. Ramazzini mentions the necessity of doing this.

> When a Physician therefore is called to visit one of the poorer and meaner sort of People, I would advise him not to feel the Pulse as soon as he comes into a Room, without inquiring into the Circumstances of the Patient, nor to stand, as it were, in a transient Posture, to prescribe where the Life of Man is concerned; but to sit down by the Patient, let the Place be never so sorry, and carefully interrogate him upon such Things, as both the Precepts of our Art, and the Offices of Humanity require us to know. The Divine Hippocrates informs us, that when a Physician visits a Patient, he ought to inquire into many things, by putting Questions to the Patient and Bystanders . . . To which I would presume to add one Interrogation more; namely, what Trade he is of. For though this Question may be referred to the morbific Causes, yet I reckon it very convenient, and absolutely necessary, when we have to do with the vulgar ordinary Patients: But I find it very seldom minded in the common Course of Practice, or if the Physician knows it without asking he takes but little notice of it: Though at the same Time a just Regard to that, would be of great Service in facilitating the Cure.

Morgagni in his great book, *De sedibus et causis morborum,* published in 1761, mentioned the former occupation of almost all of the cases he described.

Ramazzini gave the medical world a text book outlining a new subject. His distinction of two great groups of occupational diseases, one due to the material and one due to the labor involved, was very good indeed and was accepted by most physicians who in the following years wrote on the subject. Ramazzini's book was a mine of information often consulted during the 18th and early 19th centuries. As a matter of fact the 18th century had very little to add to what Ramazzini had said. Hecquet's *La médecine, la chirurgie, et la pharmacie des pauvres,* published in 1740 contains mere abstracts from Ramazzini, and the two most popular medical dictionaries in which occupational diseases were described took their material from Hecquet[20].

20. Dictionnaire de Santé, Paris, 1760.—Dictionnaire de Médecine, Paris, 1772.

The physicians knew how to prevent many such accidents and yet, hardly anything was done to protect the workers during the 18th century. They had to protect themselves as well as they could. At the same time, however, the industrialization of Europe progressed faster than ever before. The steam engine introduced in the textile and mining industry accelerated the development, created different working conditions and, at the same time, new hazards. Mechanical forces of high potency were brought close to man, threatening his life. In the early 19th century, beginning in England, the industrial population increased tremendously and was living and working under appalling hygienic conditions. The death rate was high and the duration of life exceedingly short. Public opinion was aroused by the report of a committee of investigation in Manchester in 1795. The ruling class recognized that a sick proletariat was a menace to its own health. Another report on "The sanitary conditions of the laboring population," published in 1838, revealed that the condition had not improved but, on the contrary, had become even worse. A very fine little book published in 1832 by a physician in Leeds, C. Turner Thackrah, on *The effects of arts, trades, and professions, and of civic states and habits of living, on health and longevity,* revealed striking figures. In the industrial city of Leeds in 1821 there was one death per 55 inhabitants, while in a neighboring rural district there was one death per 74 inhabitants. "At least 450 persons therefore die annually in the borough of Leeds from the injurious effects of manufactories, the crowded state of population and the consequences of bad habits of life," was the conclusion of Thackrah who then proceeds,

> Everyday we see sacrificed to the artificial state of society one and sometimes two victims, whom the destinies of nature would have spared. The destruction of 450 persons year by year in the borough of Leeds cannot be considered by any benevolent mind as an insignificant affair. Still less can the impaired health, the lingering ailments, the premature decay, mental and corporeal, of nine-tenths of the survivors, be a subject of indifference. Nor is it in Leeds only that inquiry produces so painful a result. Leaving out of the question London and the Seaports, we might prove that Sheffield, Manchester, Birmingham, in fact, all our great manufacturing towns, exhibit

an equal or a greater excess of mortality,—and an excess increasing with the magnitude of the population. If we should suppose that 50,000 persons die annually in Great Britain from the effects of manufactures, civic states, and the intemperance connected with these states and occupations, our estimate I am convinced would be considerably below the truth. Can we view with apathy such a superfluous mortality, such a waste of human life? Assuredly an examination of our civic states and employments has long been demanded, alike by humanity and by science.

Thackrah wrote his courageous book "to excite the public attention to the subject." He was well aware that the upper class did not like to have this subject discussed but he was convinced that conditions could be, and must be, improved.

Most persons, who reflect on the subject, will be inclined to admit that our employments are in a considerable degree injurious to health, but they believe, or profess to believe, that the evils cannot be counteracted, and urge that an investigation of such evils can produce only pain and discontent. From a reference to fact and observation I reply, that in many of our occupations, the injurious agents might be immediately removed or diminished. Evils are suffered to exist, even where the means of correction are known and easily applied. Thoughtlessness or apathy is the only obstacle to success. But even where no adequate remedy immediately presents itself, observation and discussion will rarely fail to find one. We might even say, that the human mind cannot be fairly and perseveringly applied to a subject of this kind, without decided effect.

The work of the physicians was important but it was obvious that conditions could only be improved by way of legislation. The first Factory Act "The Health and Morals Apprentices' Act" was passed in 1802 and was followed in the ensuing years by other acts removing some of the worst abuses, particularly in the exploitation of women and children. In spite of them conditions were still bad enough.

In France it was the report of the Prefect of Police, Dubois, of 1807 that revealed the terrifying health conditions of the industrial population. The physicians were not idle in France either. In 1822 Ph. Patissier published a French translation of Ramazzini to which he added his own observations. He recognized that as a foundation for further research, statistics should be made of the death-rate in the various occupations. He made such statistics himself for the year 1807 based on the deaths that occurred in the Paris hospitals. The relationship between death-rate and wages was clearly seen by Villermé who, later, in 1840 pub-

lished very interesting statistics. What should be done? Patissier suggested the following. First, dangerous trades should be entirely forbidden or, if this proves impossible, only criminals sentenced to death and pardoned to hard labor should be allowed to work in such trades. Second, research should be done so as to improve the working conditions by applying measures of industrial hygiene. Third, the states should have public baths easily available to the workers. Fourth, workers injured through their labor should be compensated and should have old-age insurance. There were 120 Sociétés de Prévoyance, including 40,000 workers, in France in 1822. They were mutual benefit societies organized by the Société Philanthropique.

Germany was industrialized much later than England or France and it is characteristic that it was the report of a recruiting officer that drew the attention of the public to the health conditions in the working population. Travelling in the Rhine region he found the health conditions such that the army would soon be deprived of recruits. The North German Union in 1869 in its Industrial Code stated that "every manufacturer must at its own cost establish all necessary appliances for safeguarding its employees against dangers to health and life." Social insurance was inaugurated in Germany in 1883 and as it included accidents and diseases, provisions were made to give medical service to the working population.

In the United States the literature on occupational diseases began in 1837 with a dissertation *On the influence of trades, professions and occupations* written at the instigation of the New York Medical Society[21]. Factory legislation followed from the middle of the century on and developed rather slowly.

It is not until the 20th century that there was a real improvement in working conditions. The World War proved to be a strong stimulus. Workers were scarce. Their health, therefore, meant a great deal. Research was

21. International Labour Office. Occupation and Health, vol. II, p. 381, Geneva, 1934.

done, chairs for industrial hygiene were established in quite a few universities, industrial clinics were opened, the first in 1910 in New York and Milan, museums were established in various countries showing the sources of industrial hazards and the way to prevent them. The most important improvements were due to legislative acts, their principles being the same in all countries: medical inspection of industrial undertakings, compulsory reporting of industrial diseases and compensation of the diseased and disabled workers. In 1906, revising the Workman's Compensation Act of 1897, England included 31 industrial diseases. This act had a great influence upon the United States.

It is obvious that the Soviet Union would pay great attention to industrial diseases and accidents. Research institutes have been created all over the Union and the health of the working population is being improved not only through measures of industrial hygiene but also through the reduction of working hours, the organization of rest and recreation and a system of socialized medicine that makes medical care available to all.

There can be no doubt that the working conditions have greatly improved in almost all civilized countries and yet, you know as well as I, that what has been achieved so far is just a beginning. In a highly industrialized society where the machine is no longer restricted to the workshop but has invaded the streets, the hazards will always be great. To reduce them to a minimum is only possible through the cooperative efforts of physician, engineer, statesman and educator.

SHOCK AND HEMORRHAGE*

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The following description of the clinical picture of shock was given by Samuel D. Gross in 1872. "The person, although severely injured, congratulates himself upon having made an excellent escape, and imagines that he is not only in no danger, but that he will soon be about again; in fact, to look at him, one would hardly suppose, at first sight, that there was anything serious the matter; the countenance appears well, the breathing is good, the pulse is but little affected, except that it is too soft and frequent, and the mind, calm and collected, possesses its wonted vigor, the patient asking and answering questions very much as in health. But a more careful examination soon serves to show that deep mischief is lurking in the system; that the machinery of life has been rudely unhinged, and that the whole system is profoundly shocked; in a word that the nervous fluid has been exhausted and that there is not enough power in the constitution to reproduce and maintain it. The skin of such a person assumes an icterode, or sallow, cadaverous appearance, feeling at the same time doughy and inelastic; the extremities are deadly cold; the pulse makes a desperate effort at reaction, but is, at best, weak and tranquil for one who has sustained such an amount of violence. The system does not seem to be conscious of what has occurred; its sensibilities are blunted, and it is incapable of suffering. Nature, to use the language of Hunter, does not feel the injury." There have been advances in our knowledge concerning the mechanism of the production of shock since 1870, but this description of the clinical picture by Gross could not be improved upon at the present time.

Since the World War shock has been divided grossly into two types. Primary shock refers to the condition in which a decline in blood pressure is noted immediately following the receipt of an injury. A satisfactory explanation for this condition seems to have been offered by Goltz in

* Delivered October 19, 1936.

experiments in which it was found that the essential alteration was a vasodilatation. Secondary shock refers to the type in which the interval separating the injury and the decline in blood pressure is usually an hour or longer. It has been in an effort to explain this condition that most of the theories have been advanced. Perhaps the most divergent views have been expressed by those who maintain that shock is associated with a general relaxation of the vessels and by those who state that it is accompanied by vasoconstriction. Evidence of a convincing nature has been offered to show that secondary shock except in the terminal stages is associated with vasoconstriction. The proven facts in the case are that it is accompanied by a diminution in the blood volume and a decrease in the blood pressure. As a result of these findings, most of the theories have become untenable. During the past fifteen years, the toxemia theory has been rather generally accepted. This theory differs from the others which consider a diminution in the blood volume, vasoconstriction and capillary congestion as the essential disturbances in secondary shock in that evidence as to the initiating agent is suggested. It has in common with other theories the fact that no initiating agent has actually been demonstrated.

The most often quoted experiments that had to do with the formulating of the toxemia theory are those that were performed by Cannon and Bayliss in which shock was produced by traumatizing one of the posterior extremities of anesthetized cats. Following the death of the animals the injured and non-injured extremities were amputated by symmetrical cuts across the upper thighs, they were weighed and the difference in weight was determined. They found that there was not a sufficient difference in weight to account for the decline in blood pressure and death by the loss of blood into the injured area. Section of the spinal cord in the upper lumbar region, in some experiments, showed that the fall in blood pressure was not due to any general effect of the trauma on the circulation, brought about by nervous agencies. The decline in blood pressure

could not be explained on the basis of fat embolism, acapnia or acidosis. It was assumed that the continued fall in blood pressure was due to the absorption of some depressant substance from the injured area into the general circulation. The effects of injecting histamine and of traumatizing muscles were compared in various experiments and it was believed that the hypothetical depressant produced by injuring muscles was either histamine or some closely related substance.

I repeated the experiments of Cannon and Bayliss using deeply anesthetized dogs instead of cats. It was observed that the swelling which followed the injury was not limited to the area directly traumatized but extended into the loose tissues of the groin and flank. Hence it seemed that their amputations had not been performed at a sufficiently high level if the entire loss of blood and lymph into the injured part were to be determined. The method which I used was briefly as follows: A midline abdominal incision was made. The symphysis pubis was divided in the midline. The bladder and rectum were removed. The aorta and inferior vena cava were doubly ligated and divided. A posterior midline incision was made and the lower portion of the body was divided into two parts, the tail being discarded.

The difference in the weights of the traumatized and non-traumatized extremities in these experiments showed that approximately one half of the total blood volume had been lost into the injured part, which was sufficient by itself to account for the decline in pressure. Similar results were obtained by Parsons and Phemister.

Many other experiments of a somewhat different nature were performed. One of these consisted of isolating the femoral artery in the groin, placing a tourniquet around the upper thigh constricting all structures save the artery and of traumatizing the thigh distal to the tourniquet. In these experiments there was no possibility for the absorption of toxic products from the injured part. Death occurred several hours following the traumatization and it was found that there was a loss of a sufficient part of the blood volume into the injured part to have caused it.

In other experiments, the effects of milder trauma to an extremity, of trauma to the intestines and of burns were studied. Analysis of the fluid that escaped into or from the injured area in these experiments was carried out by Dr. Beard and others. It is to be noted in the experiments in which the intestines were traumatized that the fluid escaping into the peritoneal cavity had approximately the same composition in protein as the blood plasma. This was true of other constituents as well. The protein content is emphasized because it is protein which attracts fluid to the blood stream and holds it there, which is all important in maintaining the blood volume.

I shall consider in detail only the experiments in which burns were produced. These studies were performed on animals profoundly anesthetized with sodium barbital. The animals did not blister when burned but the skin became leather-like and fluid accumulated in the subcutaneous tissues. As has been stated, this fluid is blood plasma. The amount of this fluid was determined as follows: Only one half of the body surface was burned. Following the death of the animals, which in our experiments occurred after an average interval of fifteen hours, the body was divided into two parts by anterior and posterior incisions. The internal organs and head were discarded, and the difference in the weights of the two parts was determined. The average difference in weight equalled 3.34 per cent of the total body weight, the burned side always being the heavier. A comparison with the results of other experiments in which death was produced by the removal of blood plasma, shows that the collection of blood plasma at the site of the burn was sufficient to account for the decline in blood volume and death. It is my belief that fatalities in the human which occur within thirty-six hours following burns are due to the loss in blood plasma and the accompanying increase in the concentration of the red blood cells. Deaths which occur a number of days later are probably due to other factors.

In association with Dr. Johnson the effects on the cardiac output and blood pressure of hemorrhage, of muscle trauma, and of histamine administration were studied. Taking up first the effects of hemorrhage, it was observed that following the removal of blood equalling 27 cc. per kilogram of body weight the output of the heart had diminished considerably whereas there was very little alteration in the blood pressure. Forty minutes following the traumatization of an extremity, it was noted that the output of the heart had declined greatly whereas there was very little alteration in the blood pressure. On the other hand following the administration of histamine the blood pressure declined first and the output of the heart subsequently. Burch and Harrison found that the injection of large amounts of novocain into the spinal canal produces alterations similar to those that are produced by the injection of histamine. I have recently found that primary shock and bilateral adrenalectomy also are accompanied by similar alterations. Trauma to the central nervous system is usually accompanied by a simultaneous decline in the cardiac output and blood pressure. The only point which I wish to emphasize here is that uncomplicated hemorrhage and trauma to an extremity are both associated with first, a decrease in the output of the heart followed later by a decline in the blood pressure, while the alterations appear in the reverse order as a result of the injection of histamine.

Results of a somewhat similar nature were found by Roome, Keith and Phemister in experiments in which a low blood pressure was produced by a variety of procedures which included, hemorrhage, trauma to an extremity, plasmaphaeresis, histamine administration, etc. After the pressure had been reduced to a low level, the quantity of blood that it was necessary to remove in order to cause death was determined. Following hemorrhage and trauma, it was found that the removal of a relatively small volume of blood resulted in death whereas it was necessary to remove larger quantities when the pressure had been caused to decline by histamine administration.

If the observations which I cited are correct, then one may ask why it is that the criteria of shock and hemorrhage are not identical. As an example of the belief that they are not identical, it is usually stated that shock is associated with an increase in the concentration of the red blood cells, with no response to the transfusion of blood and with capillary congestion and hemorrhage in the tissues. On the other hand, hemorrhage is said to be associated with a dilution of the red blood cells, with a favorable response to transfusion and with an anemic appearance of the tissues. Evidence will be presented which shows that some of these statements are erroneous.

Experiments were performed on dogs in which the blood pressure was gradually reduced to a low level by the slow withdrawal of blood from the femoral artery. No anesthesia was used in these experiments except for the injection of novocain at the sites where the cannulae were introduced. After having produced a sustained decline in the pressure to approximately 70 mm. of mercury, the animal was allowed to die without having further blood removed. The desired condition was to have the blood pressure remain at a low level as long as possible preceding death. Usually death occurred approximately an hour after a sustained reduction in the pressure had been obtained. Capillary congestion and hemorrhage were noted in some of the organs at autopsy. An increase in the concentration of the red blood cells occurred in a few experiments.

A low blood pressure of longer duration was produced in other experiments. The pressure was reduced by the removal of blood from the femoral artery and death was delayed by the introduction of blood by the direct method from a suitable donor. If the blood pressure rose above 70 mm. of mercury further blood was removed. If death seemed imminent, a small quantity of blood was withdrawn from the donor and injected intravenously. In this manner, the blood pressure was maintained at a low level for several hours before death occurred. No evidence that the blood was incompatible was observed. The blood pressure records in these experiments were quite similar to those

that were obtained when an extremity was traumatized. All of the animals died despite the fact that more blood was introduced than was removed. In other words, after the blood pressure remained at a low point for several hours, transfusion was without benefit. An increase in the concentration of the red blood cells was found in all experiments. Capillary congestion and hemorrhage and necrosis were present in many of the tissues of the body. Particularly striking was the presence of free blood in the lumen of the intestinal tract.

Thus it is to be noted that an increase in the concentration of the blood, a negative response to transfusion, and marked alterations in the tissues in the body can be produced by hemorrhage and that they are not peculiar to traumatic shock.

In the care of patients, one rarely encounters as a result of hemorrhage a low blood pressure that persists for several hours. If bleeding from a large blood vessel takes place, usually either early death occurs or the loss of blood is stopped and recovery follows. If the bleeding results in almost immediate death, an anemic appearance of the tissues is found at autopsy. If the bleeding is controlled, usually the remaining volume of blood is augmented by the passage of fluids from the tissue spaces into the blood stream or fluid is added artificially, and a rise in the blood pressure and a decrease in the concentration of the blood occur. A somewhat different set of conditions is encountered when fluid is lost from many small vessels into an injured part. The speed with which fluid leaves the blood vessels is usually slower because of the small size of the vessels and because of the pressure in the tissue spaces. As the pressure in the blood vessels diminishes and the pressure in the tissue spaces increases, the loss of fluid locally is still further retarded. The fluid that is lost has a larger proportion of plasma and a smaller proportion of red blood cells than that existing in the blood stream. This accounts partially for the increase in the concentration of the blood. Since the blood pressure usually remains at a low point for a considerable time preceding death

following trauma to large masses of muscle, the tissues of the body are partially deprived of blood and oxygen and alterations such as capillary congestion and dilatation and hemorrhage take place.

These observations explain why the treatment of severe shock is so unsatisfactory. After damage has resulted from an inadequate supply of blood to the tissues for a considerable time, regardless of the cause, fluids introduced into the blood stream will escape. As apparent exceptions to this statement, one observes occasionally the recovery of patients in whom the blood pressure has remained at a low level for a long time.

There may be various contributory factors which are partially responsible for the production and maintenance of shock. Food and water deprivation and exposure to cold increase the ease with which it can be produced. Prolonged anesthesia may greatly exaggerate the condition. I have observed recently that profound anesthetization with ether for six hours results in capillary hemorrhage and congestion in many of the organs of the experimental animal. Just as a serious illness reduces one's ability to withstand the loss of blood, similarly it lessens the amount of trauma that can be tolerated.

I would like to make several additional remarks concerning the treatment of shock. Drugs which constrict arterioles raise the blood pressure but do not increase the blood volume and that is what one wishes to accomplish. Vasoconstrictor drugs are of little value except in shock accompanied by vasodilatation. If one is to increase the blood volume, fluids must be introduced.

As regards the choice of fluid, the following study is of interest. In this experiment, a large quantity of salt solution was introduced intravenously while the intestines were being traumatized. It is to be noted that not only did most of the salt solution escape but that it carried a great deal of protein with it, thus diminishing the protein content of the blood plasma and decreasing the osmotic pressure. Blood is much the better fluid to inject for even though a large part of it escapes through the injured

capillaries, that remaining in the blood stream maintains a normal protein content as protein is present in the blood that is introduced. Andrus and Heuer have obtained encouraging results with the use of extracts of the adrenal cortex.

We have attempted a classification of acute circulatory failure from a physiological viewpoint. The modern tendency in surgery is to classify all forms of acute circulatory failure complicating operations and wounds, except organic heart failure, under the head of shock. The terms that have been used to designate the different types are:

Hematogenic Type. First to be considered is the hematogenic type. The initial and the most important circulatory change is the diminution in the blood volume. It is with the hematogenic type of shock that this paper is largely concerned. Shock as a result of uncomplicated hemorrhage is the simplest example. Shock following trauma to large masses of muscle belongs to this group, if my experiments and those of Parsons and Phemister have been interpreted correctly.

Neurogenic Type. This term is used to designate the condition that is usually known as primary shock or collapse. It is more rapid in onset than the hematogenic type. The primary alteration is vasodilatation dependent on diminished constrictor tone as a result of influences acting through the nervous system.

Vasogenic Type. Vascular dilatation may be brought about by agencies which act directly on the vessels. Histamine probably exerts the major portion of its effect in this manner.

Cardiogenic Type. Acute circulatory failure as a result of primary disturbance of the heart occurs rarely. It is characterized by venous distention in contrast to the collapsed condition of veins that is found in peripheral circulatory failure. A rapid accumulation of fluid in the pericardial cavity produces this type of alteration.

A number of workers have repeated our experiments on severe trauma using similar anesthetics and have obtained similar findings. However, O'Shaugnessy and Slome using lighter anesthesia claim that it is necessary to invoke a nervous factor. They think that the loss of fluid at the site of injury is the most important factor but that it is necessary to add the neurogenic forces. Although another group in England has failed to confirm their results, I believe they contain important findings and cannot be dismissed lightly.

Freeman of this country considers vasoconstriction as probably the most important of the initiating factors in the production of shock. Even if it is an auxiliary subsequently, vasoconstriction delays the decline in blood pressure and the development of shock following hemorrhage by diminishing the calibre of the blood vessels. Swingle and his associates have reported that deficiency of adrenal cortex hormone results in increased permeability of capillaries and loss of plasma with blood concentration and serious reduction in circulating blood volume. They assume that this plays a role in surgical shock but proof of this view is lacking.

I would like to make several additional remarks concerning the first type, namely hematogenic shock. The initial and the most important circulatory change is the diminution in the blood volume. Unless the initial decrease in blood volume is too great, compensatory vasoconstriction maintains the arterial blood pressure at or near the normal level. The decline in blood volume is followed by a decrease in the return of blood to the heart and hence in a decrease in the cardiac output. If the volume of circulating blood continues to diminish, the blood pressure declines even though vasoconstriction is maintained. If the blood pressure remains depressed for a considerable time, the vasoconstrictor mechanism fails and vasodilatation results. When this stage has been reached, many other factors enter into the picture and make the condition worse. Most of these factors are probably common to all types of severe

shock regardless of the mechanism of the production. These include an insufficent supply of oxygen to the tissues with resulting damage, a decrease in the production of heat, an increase in the viscosity of the blood, an increase in capillary permeability, a diminution in the alkali reserve and probably the accumulation of toxic products. I think we can say with safety that histamine is not the cause in most instances. Muscle has a very low content of depressor substances. The amount of these substances necessary to produce shock could be obtained only by careful extraction from a mass of muscle greater than the entire weight of the animal (Slome). Recently, Sir Henry Dale made the following statement, "With regard to a possible role of histamine, we know now, what we did not know then, that of all the major tissues of the body, the muscles contain least of that substance. Whatever else it may have been, the shock following the Bayliss-Cannon limb trauma was not histamine poisoning."

As regards the second type, neurogenic shock, it is seen typically in the fainting which accompanies emotional distress or minor injuries. A similiar collapse may occur when the upper abdomen is opened and explored or in association with operations on the brain. The shock is explained by sudden inhibition of vasoconstrictor tone of central origin. The blood pressure may remain at a low level for an hour or more and then may rise spontaneously or following the giving of a vasoconstrictor drug with no subsequent ill effect. A similar fall of pressure in hematogenic shock would be a matter of grave concern. Neurogenic shock is associated with a reduction in blood pressure, with little or no decline in the blood volume and an adequate flow of blood to the vital centers is maintained for a much longer time than in the hematogenic type.

There are many instances of shock which are not so simple and which cannot be placed in any single one of these four types but are rather combinations of several of them. An example of this is the shock which follows the perforation of peptic ulcers. We have simulated this con-

dition experimentally by collecting and introducing into the peritoneal cavities of other dogs the various juices which empty into the stomach and duodenum. All of the animals became quite ill immediately following the introduction of one or more of the upper intestinal juices. The condition then seemed to improve for a while and became worse later as is frequently observed in the human following the perforation of a peptic ulcer. The most severe reactions were observed following the introduction of bile or pancreatic juice and the combination of the two exerted more ill effects than an equal volume of either of them alone. It seems possible that the pancreatic juice is actuated by the bile, thus increasing the total of the effects. The changes in the cardiac output and blood pressure produced by the introduction of the juices were studied. Although the results were not identical in all instances, it can be stated that the major primary alteration was a decline in the blood pressure, as is found in primary shock, and the subsequent change consisted of a greater drop in the cardiac output than in the blood pressure, as is found in secondary shock.

The initial signs and symptoms that were observed following the intraperitoneal injections appear too early to be explained by the absorption of toxic material. It seems likely that the most important of the early actions of the juices is that of a chemical irritant. This results in a dilatation of many small intraperitoneal vessels and I believe that it is brought about mainly by direct action on the vessels rather than through nerves, although both methods are probably concerned. At any rate, an early decline in the blood pressure is usually observed. After the blood volume decreases as a result of the marked increase in the circulatory bed and the passage of fluid into the peritoneal cavity, the output of the heart diminishes. The blood pressure is probably prevented temporarily from declining further by vasoconstriction elsewhere.

I wish to emphasize again the fact that the mechanism of the production of all instances of shock is not the same, and they cannot all be satisfactorily explained by one

theory. Dr. Ewing recently said, "There is no one cause of cancer", and I think the same statement may be made with safety in regard to shock. That which develops following trauma to an extremity is a simple example in that the decline in blood volume is due certainly in the main to the loss of blood and plasma at the site of injury. It has been shown that the condition which develops following the perforation of peptic ulcers is not as simple to explain. Many different agencies may enter into the production of shock that is associated with operations. Among these may be included, hemorrhage, sweating, the anesthetic, loss of plasma from exposed surfaces, the pooling of blood in vessels that are dilated as a result of mechanical irritation or nervous reflexes, infection and the diseases for which the operation is performed.

In conclusion, the term shock should be used to designate a clinical syndrome that is familiar to all. The pallor, apathy, sweating, cold skin, vomiting and weak pulse form part of the fully developed picture. The work of recent years has shown that it is dependent on an inadequate supply of blood to the tissues, which may be brought about by the most diverse causes.

DEATHS OF FELLOWS OF THE ACADEMY

Robinson, Meyer R., M.D., 1125 Madison Avenue, New York City; graduated in medicine from the College of Physicians and Surgeons in 1900; elected a Fellow of the Academy January 6, 1910; died November 2, 1936.

Dr. Robinson was gynecologist to the Beth Israel Hospital and chief gynecologist and obstetrician to the Beth Moses Hospital. He was a Fellow of the American College of Surgeons, the American Medical Association and held a certificate of the American Board of Obstetrics and Gynecology. He was also a member of the County and State Medical Societies.

Rushmore, Edward Cary, B.S., M.D., Tuxedo Park, New York; received the degree of Bachelor of Science from Swarthmore College of Pennsylvania in 1881 and graduated in medicine from the College of Physicians and Surgeons in 1886; elected a Fellow of the Academy June 4, 1896; died November 2, 1936. Dr. Rushmore had been medical director of the Memorial Hospital. He was a Fellow of the American Medical Association and a member of the County and State Medical Societies.

COMMITTEE ON MEDICAL EDUCATION

Report On The Ninth Annual Graduate Fortnight

October 19 to 31, 1936

In January the Committee on Medical Education chose "Trauma; Occupational Diseases and Hazards" as the general subject for the Ninth Annual Graduate Fortnight. A Subcommittee, composed of Dr. John J. Moorhead, Chairman, and Drs. Walter P. Anderton, Frederic W. Bancroft, Harlow Brooks, Emanuel Libman, William F. MacFee and Harrison S. Martland, was appointed to prepare the general plan and direct its carrying out. The dates were set as October 19 to 31. A registration fee of $3.00 was decided upon.

It was decided to present the same features as in previous years, that is, evening meetings to be held at the Academy, afternoon clinics to be held in selected hospitals (twenty-two being invited to participate), and an exhibit; and in addition, to arrange special demonstrations or moving pictures to follow each of the evening meetings at the Academy. A Committee on Clinics was appointed with Dr. Charles F. Tenney as Chairman, Dr. Tenney having been appointed a member of the Subcommittee to replace Dr. Harlow Brooks, deceased. The Clinic Committee was made up of representatives appointed from each hospital which participated in the Fortnight, and met several times with the Subcommittee to plan and coordinate the clinical programs. Dr. Martland was chosen Director of the Exhibit and a Committee was appointed to assist him.

Two to four speakers were selected for each evening and were asked to limit their talks in order that the meetings might be concluded by ten o'clock. No arrangements were made for publication of papers presented at the evening meetings, but speakers were informed that the Academy reserved the rights to publish papers presented at these meetings in one of its journals or in the form of a volume,—release of papers to the authors to be given in case publication by the Academy was not undertaken.

Publicity. In May, an announcement in the form of a reading notice was sent to a group of important medical journals, medical libraries and medical societies, requesting that some publicity be given to the event. As a result, a number of reading notices appeared throughout the country.

In June, a preliminary announcement, with return postcard attached, giving a comprehensive outline of the Fortnight was mailed to over twenty thousand registered physicians living within a radius of one hundred miles of New York City. The complete program was printed in July and mailing was begun in August 4; 176 requests were received for copies of the complete program.

Registration and Ticket Distribution. A total of three hundred and forty-four physicians registered for the Fortnight. These registrants came from sixteen states, four from Canada and one from the Republic of Panama. Somewhat under half came from New York City. Fellows and Members of the Academy were issued tickets without charge.

Attendance at Evening Meetings averaged three hundred and forty-six. The smallest attendance was two hundred and eleven and the largest five hundred and forty-eight.

Afternoon Clinics had an average attendance of fifty to sixty.

The Exhibit had an average attendance of three hundred and seventy-five to four hundred. It included one hundred and twenty-five exhibits presented by one hundred and sixty-four exhibitors. The exhibits were presented in five large exhibition rooms of the Academy building, besides halls and adjoining anterooms and included 1589 x-rays, 1672 photographs, 220 pathological specimens, 560 charts and drawings and approximately 400 models, equipment, apparatus and instruments. No tickets of admission were required to visit the exhibit.

The following is a tabulation of the registrations:

REGISTRATION—TOTAL 344

From New York State 262

Manhattan	140	Bronx	37
Brooklyn	33	Queens	14
Westchester	5	Richmond	4

Up-State New York *29*

From New Jersey *41*

From 15 other States and Countries *41*

Connecticut	7	Ohio	5
District of Columbia	2	Pennsylvania	7
Illinois	1	Virginia	1
Indiana	2	West Virginia	2
Louisiana	2	Wisconsin	1
Maine	1	Utah	1
Massachusetts	2		
Michigan	1	Canada	4
Minnesota	1	Republic of Panama	1

JOHN J. MOORHEAD, *Chairman*
WALTER P. ANDERTON
FREDERIC W. BANCROFT
EMANUEL LIBMAN
WILLIAM F. MACFEE
HARRISON S. MARTLAND
CHARLES F. TENNEY

RECENT ACCESSIONS TO THE LIBRARY

("Possession does not imply approval")

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